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Identification of optimal linear perturbations in a premixed laminar flame by global resolvent analysis CHUHAN WANG, Laboratoire d'Hydrodynamique, CNRS/Ecole Polytechnique/Institut Polytechnique de Paris , THOMAS LUDWIG KAISER , Laboratory for Flow Instabilities and Dynamics, Technische Universitt Berlin , MAX MEINDL, Technical University of Munich, KILIAN OBERLEITHNER, Laboratory for Flow Instabilities and Dynamics, Technische Universitt Berlin, WOLFGANG POLIFKE, Technical University of Munich, LUTZ LESSHAFFT, Laboratoire d'Hydrodynamique, CNRS/Ecole Polytechnique/Institut Polytechnique de Paris — The global response to forcing of a 2D laminar premixed slot flame is investigated with a linearized approach, where multiphysics coupling in a non-parallel reacting flow is accounted for. The classical flame transfer functions obtained this way are in good agreement with nonlinear reference calculations, performed with the AVBP code from CERFACS. Optimal forcing input, leading to maximal heat release fluctuations, are identified via resolvent analysis. Compared to similar recent investigations, we use a finite-element discretization on an unstructured mesh, and we employ a reduced two-step scheme for methane-air reaction. Strong sensitivity to flame parameters and chemical modeling is observed. The present linear analysis opens new ways for the physical discussion of instability dynamics in flames.

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